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Odyssey: melting snow caused gullies

By Mary Hardin

This visible-light image (left), taken by the thermal emission imaging system on JPL's 2001 Mars Odyssey spacecraft, shows the gullies in the top right-center as they appear to emerge from beneath and within a gradually disappearing blanket of snow. The image on the right, taken by the Mars orbiter camera on JPL's Mars Global Surveyor spacecraft, shows numerous gullies, with a remnant of the snow pack (arrow) proposed to be the source of water that eroded the gullies.

IMAGES FROM THE VISIBLE LIGHT CAMERA ON JPL'S MARS ODYSSEY spacecraft, combined with images from the Lab's Mars Global Surveyor, suggest melting snow is the likely cause of the numerous eroded gullies first documented on Mars in 2000 by Global Surveyor.

The now-famous Martian gullies were created by trickling water from melting snow packs, not underground springs or pressurized flows, as had been previously suggested, argues Dr. Philip Christensen, the principal investigator for Odyssey's camera system and a professor from Arizona State University. He proposes gullies are carved by water melting and flowing beneath snow packs, where it is sheltered from rapid evaporation in the planet's thin atmosphere. His paper is in the electronic Feb. 19 issue of Nature.

Looking at an image of an impact crater in the southern mid-latitudes of Mars, Christensen noted eroded gullies on the crater's cold, pole-facing northern wall and immediately next to them a section of what he calls "pasted-on terrain." Such unique terrain represents a smooth deposit of material that Mars researchers have concluded is "volatile" (composed of materials that evaporate in the thin Mars atmosphere), because it characteristically occurs only in the coldest, most sheltered areas. The most likely composition of this slowly evaporating material is snow. Christensen suspected a special relationship between the gullies and the snow.

"The Odyssey image shows a crater on the pole-facing side has this 'pasted-on' terrain, and as you come around to the west there are all these gullies," said Christensen. "I saw it and said 'Ah-ha!' It looks for all the world like these gullies are being exposed as this terrain is being removed through melting and evaporation."

Eroded gullies on Martian crater walls and cliff sides were first observed in images taken by Mars Global Surveyor in 2000. There have been other scientific theories offered to explain gully formation on Mars, including seeps of ground water, pressurized flows of ground water (or carbon dioxide), and mudflows caused by collapsing permafrost deposits, but no explanation to date has been universally accepted. The scientific community has remained puzzled, yet has been eagerly pursuing various possibilities.

"The gullies are very young," Christensen said. "That's always bothered me, because how is it that Mars has groundwater close enough to the surface to form these gullies, and yet the water has stuck around for billions of years? Second, you have craters with rims that are raised, and the gullies go almost to the crest of the rim. If it's a leaking subsurface aquifer, there's not much subsurface up there. And, finally, why do they occur pre-

entially on the cold face of the slope at mid-latitudes? If it's melting groundwater causing the flow, that's the coldest place, and the least likely place for that to happen."



Christensen points out that finding water erosion under melting snow deposits answers many of these problems. "Snow on Mars is most likely to accumulate on the pole-facing slopes, the coldest areas. It accumulates and drapes the landscape in these

areas during one climate period, and then it melts during a warmer one. Melting begins first in the most exposed area right at the crest of the ridge. This explains why gullies start so high up." Once he started to think about snow, Christensen began finding a large number of other images showing a similar relationship between "pasted on" snow deposits and gullies in the high-resolution images taken by the camera on Global Surveyor. Yet it was the unique mid-range resolution of the visible light camera in Mars Odyssey's thermal emission imaging system that was critical for the insight, because of its wide field of view.

"It was almost like finding a Rosetta Stone. The basic idea comes out of having a regional view, which Odyssey's camera system gives. It's a kind of you-can't-see-the forest-for-the-trees problem," he said. "An Odyssey image made it all suddenly click, because the resolution was high enough to identify these features and yet low enough to show their relationship to each other in the landscape."

50 years later, photo study shows asteroid hit moon

By D.C. Agle

IN THE EARLY MORNING HOURS OF Nov. 15, 1953, an amateur astronomer in Oklahoma photographed what he believed to be a massive, white-hot fireball of vaporized rock rising from the center of the Moon's face. If his theory was right, Dr. Leon Stuart would be the first and only human in history to witness and document the impact of an asteroid-sized body impacting the Moon's scarred exterior.

Almost a half-century, numerous space probes and six manned lunar landings later, what had become known in astronomy circles as "Stuart's Event" was still an unproven, controversial theory. Skeptics dismissed Stuart's data as inconclusive and claimed the flash was a result of a meteorite entering Earth's atmosphere. That is, until Dr. Bonnie Buratti, lead scientist for asteroids, comets and satellites in Section 3224, and Lane Johnson of Pomona College, took a fresh look at the 50-year-old lunar mystery.

"Stuart's remarkable photograph of the colli-

sion gave us an excellent starting point in our search," said Buratti. "We were able to estimate the energy produced by the collision. But we calculated that any crater resulting from the collision would have been too small to be seen by even the best Earth-based telescopes, so we looked elsewhere for proof."

Buratti and Johnson's reconnaissance of the 35-kilometer-wide (21.75-mile) region where the impact likely occurred led them to observations made by spacecraft orbiting the Moon. First, they dusted off photographs taken from the Lunar Orbiter spacecraft back in 1967, but none of the craters appeared a likely candidate. Then they consulted the more detailed imagery taken from the Clementine spacecraft in 1994.

"Using Stuart's photograph of the lunar flash, we estimated the object that hit the Moon was approximately 20 meters (65.6 feet) across, and the resulting crater would be in the range of one to two kilometers (.62 to 1.24 miles) across. We were looking for fresh craters with a non-eroded appearance," Buratti said.

Part of what makes a Moon crater look "fresh" is the appearance of a bluish tinge to the surface. This bluish tinge indicates lunar soil that is relatively untouched by a process called "space weathering," which reddens the soil. Another indicator of a fresh crater is that it reflects distinctly more light than the surrounding area.

Buratti and Johnson's search of images from the Clementine mission revealed a 1.5-kilometer (0.93 mile) wide crater. It had a bright blue, fresh-appearing layer of material surrounding the impact site, and it was located in the middle of Stuart's photograph of the 1953 flash. The crater's size is consistent with the energy produced by the observed flash; it has the right color and reflectance, and it is the right shape.

Having the vital statistics of Stuart's crater, Buratti and Johnson calculated the energy released at impact was about .5 megatons (35 times more powerful than the Hiroshima atomic bomb). They estimate such events occur on the lunar surface once every half-century.

"To me this is the celestial equivalent of observing a once-in-a-century hurricane," said Buratti. "We're taught the Moon is geologically dead, but this proves that it is not. Here we can actually see weather on the Moon," she said.

While Dr. Stuart passed on in 1969, his son Jerry Stuart offered some thoughts about Buratti and Lane's findings. "Astronomy is all about investigation and discovery. It was my father's passion, and I know he would be quite pleased," he said.

Buratti and Johnson's study appears in the latest issue of the space journal Icarus.

The NASA Planetary Geology and Planetary Astronomy Programs and the National Science Foundation funded Buratti's work.



Near the center-right of this image by Dr. Leon Stuart is a lunar flare he observed in 1953.

Image courtesy of Jerry Stuart

News Briefs



Seated in one of JPL's new Global Electric Motorcars are, left to right, Bruce Troutman, Section 272 manager; Gerald Kalish, safety coordinator; James Black, Administrative Operations Group supervisor; and Marcos Falcon, Fleet Management. Standing, from left, are Fleet Management staff Terry Durham, Jim Parrish and Dominick Martinez.

Bob Brown / JPL Photolab

Lab receives energy-efficient vehicles

JPL has received from NASA the delivery of nine energy-efficient Global Electric Motor Cars (GEMs). The cars were donated to NASA by Chrysler Corp., and the agency also gave a number of the same vehicles to NASA's Dryden Flight Research Center and Ames Research Center.

Currently in use by JPL's Safety Office and Environmental Affairs Office, the electric cars use no fossil fuels. The four-passenger vehicles feature front-wheel drive and four-wheel hydraulic brakes, a safety glass windshield, and

There are option- for protection sun. The cars van, making them are battery- charger plugs into d can be fully › 10 hours. rvisor of the ons Group in Sec- he vehicles are

available for use by JPL organizations.

Black said before the donation JPL was considering purchasing some of the vehicles to comply with the federal Greening The Government Through Federal Fleet Transportation Act as well as the Energy Policy Act of 1992, which addresses the reduction of petroleum consumption through improvements in fleet fuel efficiency and the use of alternative-fuel vehicles and alternative fuels.

For more information about the cars, call MARCOS FALCON, ext. 4-4140.

Software award nominations accepted

NASA is accepting nominations for the annual Software of the Year Award, part of an effort to recognize exceptional software developed and owned by the agency.

The award is given to author(s) of scientific and technical software. The software must have been supported, adopted, sponsored, or used by NASA; be significant to NASA's aeronautical or space activities; and officially released by NASA within the last three years.

Entries and supporting material must be submitted electronically no later than April 18. For information about the nomination process, call RICH DOYLE, ext. 4-9894, or visit <http://icb.nasa.gov>.

Winners receive the NASA Software Medal, a certificate signed by the administrator, and a monetary award. NASA's Invention and Contributions Board may recommend an award up to \$100,000, depending on the value of the software to government and industry.

Changes noted for U.S. bonds

The Department of the Treasury has announced a change to the terms and conditions for U.S. Savings Bonds. Series EE and I Bonds with an issue date of February 2003 or later must be held for at least 12 months before they can be redeemed. Savings bonds issued prior to February 2003 may be cashed after six months.

For more information, visit <http://www.treasurydirect.gov>.

Chess team wins trophy

A team from JPL won the Best Industrial Team trophy over the Presidents Day weekend at the U.S. Amateur Team Chess Championship - West. The "Mars Attacks" team of JPLers RICHARD BORGEN, TIM THOMPSON and DAVID STEIN, along with San Gabriel math teacher JULIO-CESAR MARIN, won the trophy. Borgen, Thompson. Marin and LARRY STEVENS had teamed to win the same trophy in 1998.

"CALTECHnically Won," with Caltech students WHEE KY MA, EUGENE YANAYT, GRAHAM FREE and HOWARD LIU, won first place overall. They will now compete for the national title against other regional winners.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meetings are available. Call the Employee Assistance Program at ext. 4-3680 for time and location.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (The Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Group—Meets the first Friday and third Thursday of the month at noon in Building 111-117. Call the Employee Assistance Program at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parents Group for Children With Special Needs—Meets the second Thursday of the month at noon in the Wellness Place, Building 167-111.

Working Parents Support Group—Meets the third Thursday of the month at noon in Building 167-111. For more information, call the Employee Assistance Program at ext. 4-3680.

Saturday, March 1

Boys of the Lough—This Grammy Award-winning ensemble will perform a program of Celtic music at 8 p.m. in Caltech's Beckman Auditorium. Tickets are \$29, \$25 and \$21, youth high school age and younger, \$10. For more information, call (626) 395-4652.

Sunday, March 2

Chamber Music—The Debussy Trio, whose repertoire includes styles from French Impressionism to American jazz-fusion and works by film composers, will offer a free concert at 3:30 p.m. in Caltech's Dabney Lounge. For more information, call (626) 395-4652.

"Rational Mysticism: the Border Between Science and Spirituality"—Author John Horgan will present this Skeptics Society-sponsored talk at 2 p.m. in Caltech's Baxter Lecture Hall. Free for the JPL/Caltech community. For more information, call (626) 395-4652.

Tuesday, March 4

JPL Gamers Club—Meeting at noon in Building 301-227.

JPL Genealogy Club—Meeting at noon in Building 301-271.

Tues.-Wed., March 4-5

Investment Advice—TIAA/CREF representatives will be available for one-on-one counseling. For an appointment, call (877) 209-3140, ext. 2614, or visit <http://www.tiaacref.com>.

Wednesday, March 5

Associated Retirees of JPL/Caltech—Meeting at 10 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

"Catching Waves with LIGO"—Caltech physics professor Dr. Barry Barish will deliver this free lecture on the Laser Interferometer Gravitational-Wave

Observatory at 8 p.m. in Caltech's Beckman Auditorium. For more information, call (626) 395-4652.

Thursday, March 6

Investment Advice—A Fidelity representative will be available for one-on-one counseling. For an appointment, call (800) 642-7131.

JPL Gun Club—Meeting at noon in Building 183-328.

Saturday, March 8

"Planning for Your Child's Educational Future"—David Levy, assistant dean and director of financial aid at Caltech, and Catherine Thomas, associate dean of admissions and financial aid at USC, will discuss simple ways for parents to develop a financial plan for their child's college education. Hosted by the Child Educational Center and the Verdugo Hills Hospital Foundation for parents, grandparents and expectant parents. It will be held from 10 a.m. to noon at Verdugo Hills Hospital, 182 Verdugo Blvd., Glendale, 4th floor council room. A complimentary continental breakfast will be served starting at 9:45 a.m. For more information or reservations, call the CEC at ext. 4-3418.

Tuesday, March 11

"E Pluribus Unum: Future World of Mutable, Cellular Spacecraft"—Dr. Tom Yuncck of the Exploration Systems Autonomy Section will speak at noon in Building 180-101, describing an approach to Earth sensing with large arrays of tiny, free-flying cells, each of which is an autonomous sensor collecting data that may itself be of direct interest.

JPL Stamp Club—Meeting at noon in Building 183-328.

Wednesday, March 12

JPL Amateur Radio Club—Meeting at noon in Building 238-543.

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Call Roger Carlson at ext. 4-2295 for information.

Friday, March 14

Caltech Women's Club—A "Welcoming Coffee" will be held from 9 to 10:30 a.m. in von Kármán Auditorium. For more information, call Carol Anderson at (818) 790-8175.

Fri.-Sat., March 14-15

Aquila Theatre Company—This award-winning company will present *The Importance of Being Earnest* on Friday and *A Midsummer Night's Dream* on Saturday in Caltech's Beckman Auditorium. Both shows begin at 8 p.m. Tickets are \$15 for adults, \$10 for youth high school age and under. For more information, call (626) 395-4652.

Ongoing

The Social Security representative will no longer take one-on-one counseling appointments on Lab. Call the Benefits Office, ext. 4-3760, to arrange for a telephone counseling appointment.

Marshall program on the right track

This article is the second in a monthly series that describes how NASA centers are realizing the One NASA goal.



Thom Holden of NASA's Marshall Space Flight Center.

There's a picture of "Wisdom" on Thom Holden's office wall.

The picture is of an elderly bespectacled man in deep thought and it serves as a salve for any frustration that creeps into Holden's soul.

"Every time I look at it I realize there is more knowledge to be gained—more I can do to benefit all of NASA," Holden said.

He uses the same analogy when talking about the agency's "One NASA" concept—something that Holden readily agrees with and supports.

"I think it's a great idea—long overdue," Holden said. "For NASA to fulfill its missions, all of the centers really do need to operate as one entity. We need to pull together on projects and goals that reach across the agency, and I believe we are on the right track toward achieving that."

Holden, 45, leads the Implementation Support Team at the Marshall Center. He's responsible for providing change management support to the Integrated Financial Management

module projects at the center. These module projects are all part of the Integrated Financial Management Program (IFMP), which is a NASA-wide

effort to modernize its financial and administrative systems and processes. The IFM project exemplifies the "One NASA" approach to business. The program is implementing a series of new enterprise software systems and business processes through module projects.

"We've got 10 IFMP module projects," Holden said. "NASA has implemented three of those module projects to date: Resume Management, Posi-

tion Description and Travel Manager."

Resume Management, also known as "NASA Stars," is enabling the agency to have one staffing and recruiting process. Position Description Management allows supervisors to use a common database for writing job descriptions. Travel Manager provides NASA one standard system for processing travel requests.

The Core Financial Project is the fourth in the series of IFMP modules and is considered the "backbone" of the entire IFM program. It's being rolled out in waves, and implementation at all NASA centers for the Core Financial Project is scheduled to be completed later this fiscal year.

"The Core Financial module is the foundation for the whole IFM program," Holden said.

The reason it is considered the foundation is that it will allow NASA staff to provide timely, consistent and reliable information for management decisions and provide an accounting and budgeting structure to enable full-cost management.

"IFMP is ushering in entirely new and different tools for NASA employees to use and enabling the agency to conduct its financial and business affairs in a much more efficient manner," Holden said. "The IFM program will enable 'One NASA' with 10 interdependent centers. And it's doing that."

"As a part of One NASA, integrated financial management is a change of culture, a change of thought, a change in the way we do business," Holden continued. "There will be rough spots, but if people will stay the course and give One NASA and the IFM program a chance, the American people will benefit as well as the NASA community."

This month in Aeronautics and astronautics history

- | | | |
|--------------|---------|--|
| 55 years ago | 2.16.48 | • Gerard Kuiper discovered Uranus' moon Miranda. |
| 35 years ago | 2.24.68 | • Discovery of the first pulsar. |
| 26 years ago | 2.12.77 | • The Viking Lander began its deep-digging operations on Mars following the reception of commands from JPL. |
| 13 years ago | 2.10.90 | • JPL's Galileo spacecraft completed the first major milestone in its gravity-assisted flight to Jupiter when it flew a carefully designed course close to the planet Venus. |
| 5 years ago | 2.10.98 | • Galileo completed the Europa 13 flyby. |
| | 2.17.98 | • JPL's Voyager 1 passed Pioneer 10 to become the most distant human-created object in space at 10.4 billion kilometers. |





A Friend From the Beltway

BY MARK WHALEN



JPL's new congressman, Rep. David Dreier (R-Glendora), addressed JPL staff Feb. 19 to show his continued support for the Laboratory and for NASA. Dreier's 26th district seat now includes JPL and La Cañada, due to redistricting following last November's congressional elections.

LAB DIRECTOR DR. CHARLES ELACHI THANKED Dreier for the latter's longtime interest in JPL's work. Elachi noted that the congressman dropped by JPL in 1999 following the loss of Mars Polar Lander.

"I was impressed," Elachi said. "He also came a couple more times to support the morale of the people working here. When we lost contact with the spacecraft, he called me, Richard Cook and a number of other people, to tell us how much Congress is behind us and how much he personally is behind us. This was even before JPL was in his district (laughter), and that shows his commitment to the space program."

Elachi also appreciated Dreier's "(playing) a key role in reversing the language in the Senate [in the attempt to] farm out the telecommunications and mission operations activities here," Elachi said. "We should all be thankful. That would have impacted 800 jobs at JPL."

In the fiscal year 2003 budget that was just approved in mid-February, Elachi added, "Dreier played a key role in making sure that the Mars Program is fully supported, and the (new) Jovian Icy Moons Orbiter mission is fully supported."

Dreier, the first Californian and the youngest-ever member of the House Rules Committee, wished the Lab good luck on the May 30 and June 25 launches of the Mars Exploration Rovers. He considered it "an honor and a privilege just to be able to visit you. It's a thrill because there's still a little kid in every single one of us, and I believe that the work you're doing here is so important," he said.

Regarding the Feb. 1 loss of Space Shuttle Columbia, "It's obviously a real challenge and a difficult time for everyone," Dreier said. But, he pointed out, "What you do here is very tough work. Three Saturdays ago, I was reminded of the (loss of Mars Polar Lander). And while there was no loss of life in December 1999, ... it was a similar feeling to those nights when I came up here. (Then-JPL Director) Ed Stone was here, and he told me, 'If you don't take risks, you're never going to learn anything.'

"Failure is a very important part of this process, because it says you're taking those important risks. While blood, sweat and tears are given in the ... work that takes place here, it's obvious that the fact that you were pushing the envelope clearly means that you're not going to succeed every time."

Dreier recalled the "resolve and commitment" of the Columbia astronauts as noted in an emotional statement by NASA Administrator Sean O'Keefe at the memorial service in Houston. Astronaut Kalpana Chawla called over all her crewmates one day and asked them to look into the retina of her eye. They could see the reflection of the planet Earth.

Following the Columbia tragedy, "In Washington, we have in many ways redoubled our commitment to the space program," Dreier said. O'Keefe and President Bush are "very committed" to NASA's

circling this planet (with the space shuttle), getting beyond the hurdle of the pulls that exist here and moving to Mars and Jupiter and other planets is a very important step and action for us."

Dreier also expressed appreciation for JPLers' dedication. "I know you all make sacrifices," he said. "I don't know that people will look back on the last few years of the technology boom as the 'California Gold Rush,' but ... there are a lot of people in this room who could have had the potential to be very involved in that successful endeavor. Yet you all have made a conscious choice to pursue scientific truths, which I think is an extraordinarily admirable thing."

The congressman also lauded JPL's efforts in inspiring the next generation of explorers. "I was so pleased when Dr. Elachi told us how committed



work, he added. Dreier and Congressman Adam Schiff (D-Pasadena), whose district formerly included JPL, "stand together, very committed to our goal of ensuring that JPL's work continues. While there are serious problems NASA has faced, you all are the brightest spot on the horizon. I think you all should congratulate yourselves for being that very bright spot."

Dreier noted current concerns about NASA's manned vs. unmanned missions. He said Elachi mentioned there would always be a need for human involvement. "Finding water on Mars is one of our priorities, but when it comes to the process of drilling, there is going to be a need for a human component," Dreier said.

JPL's role among NASA's priorities is secure, Drier said. "The work you are doing ... should be our highest priority. Rather than spending so much time

JPL is to education, and that 70,000 students will be coming through here every single year. I thank you for that, because we know that education is so critically important. And up until Sept. 11, 2001, it was the No. 1 priority we were focused on in Washington."

Dreier, who said he considers himself "very anti-war," addressed the possible effect of a war with Iraq on the NASA budget. "We are going to expend what it takes to win the war. We know it will be costly. (But) I'm going to do everything I can to ensure that it doesn't have a negative effect on the NASA budget. I'm going to argue again that because of the national security assistance that you and other NASA programs have provided us that we should increase the NASA budget and have even greater spending as we pursue these scientific truths."

Passings

DR. ALBERT HIBBS, 78, a retired JPL scientist and manager known as the "Voice of JPL" for his work as a broadcast spokesman for myriad Lab missions, died Feb. 24 following complications of heart surgery at Huntington Hospital in Pasadena.



Dr. Al Hibbs

Hibbs earned a bachelor's degree in physics from Caltech in 1945 and a master's in mathematics from the University of Chicago in 1947. He joined JPL in 1950 as a research engineer, and during his time at the Lab earned a doctorate in physics from Caltech. He then held a number of increasingly responsible research and management positions, including chief of the Research and Analysis Section, chief of the Space Sciences Division, and manager of the Transportation Technology Office. He was also the system designer of the first U.S. satellite, Explorer I.

He may best be remembered for his service as the Lab's spokesman on the Surveyor missions to the moon; the Mariner missions to Mars, Venus and Mars; the Viking mission to Mars; and the

Voyager mission to the outer planets.

Hibbs received numerous awards for his broadcasting and radio work, including the George Foster Peabody Award for the NBC weekly television show Exploring (1963), cited as an outstanding children's program. He was also honored for his work on World of Science (1965) and About Science (1966), both broadcast on radio.

Hibbs retired from the Lab in 1986. He is survived by his wife, Marka; daughter Victoria; son Bart; sister Agnes Jones; stepdaughter Alicia Cortrite; stepson Lawrence Wilson; and three grandchildren.

Private services will be held in March. The family requests that donations in Hibbs' name be made to the Caltech Y, 415 S. Holliston Ave., Pasadena, 91125.

WILLIAM SHIPLEY, 71, former assistant laboratory director for JPL's Office of Engineering and Review, died Feb. 8 at his retirement home in Melbourne, Fla.

Shipley, a native of Washington, D.C., earned a bachelor's degree in physics from George Washington University in 1953. He joined JPL in 1955, as a research engineer, and later fulfilled



William Shipley

other supervisory and management duties before serving as manager of the Thermoelectric Outer Planet Spacecraft Advanced System Technology Project from 1968-71.

He was spacecraft development manager from 1971-77 for JPL's Voyager mission to the outer planets. He then served four years as manager of the orbiter spacecraft for the Galileo mission to Jupiter before assuming duties in quality assurance, safety and reliability.

In 1988, Shipley was appointed assistant laboratory director for JPL's Office of Engineering and Review. He retired from JPL in 1997.

Shipley is survived by his brother John; sons Stan, Craig, and Torbert; and grandsons Jacob, Nate, Eli and Augie.

In lieu of flowers, the family requests donations in Shipley's name to the Vision Rehabilitation Program at the Braille Institute, 741 N. Vermont Ave., Los Angeles, 90029.

Letters

I want to thank everyone in the JPL community for the lovely plant and warm card. My father was a wonderful man. He is missed. The thoughtfulness is appreciated. Sincerely,

Larry Divine

I would like to extend my sincerest thanks to all of my friends and colleagues in the Mission Assurance Division (51), the Office of Safety and Mission Success (5X), and those from other organizations for the cards, the beautiful JPL Store plant, and the kind words of sympathy and much-needed support during the untimely death of my sister. Your thoughtfulness and caring is greatly appreciated by our whole family.

Yolanda Walton

Retirees

The following JPL employees retired in February: John Meysenburg, 36 years, Section 336; Richard Nonaka, 36 years, Section 319; James Stultz, 35 years, Section 353; Ho-Sen Lin, 34 years, Section 341; John Zoutendyk, 29 years; David Boatman, 26 years, Section 352; Blair Lewis, 26 years, Section 345; Paul Richter, 24 years, Section 331; Reginald Cormier, 23 years, Section 333; Omer Divers, 23 years, Section 3234; Margaret Johnson, 20 years, Section 311; Enselmo Garcia, 19 years, Section 352; James Clawson, 17 years, Section 515; Jeanne Wu, 17 years, Section 212; Melville Roberts, 15 years, Section 344.

JPL'S ONLINE NEWS SOURCE



Classified ads will be available the day before Universe is published at

<http://dailyplanet>

View this and previous issues of Universe at
<http://universe.jpl.nasa.gov>

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Universe is published every other Friday by the Office of Communications and Education of the Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109.

Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted on ad cards, available at the JPL Store and the Universe office, Bldg. 111-B29C, or via e-mail to universe@jpl.nasa.gov.

Ads are due at 2 p.m. on the Monday after publication for the following issue.

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

Classifieds

For Sale

BED, Select Comfort airbed, queen sz., ultra pillow top, dual controls, with frame, \$800/ obo; STEREO SYSTEM, Technics, CD changer, receiver, dual cass., floor speakers & cabinet, \$175/ obo; PET CARRIER, 18" x 18" x 24", w/food & water dish, airline rated, used once, \$40. 395-0310 or donandellen1@earthlink.net.

BED, king, Waveless Flotation Waterbed, pine platform with 6-drawer under-bed storage, book shelf headboard, \$300/obo. 249-4096.

CAMERA, Hasselblad, 500 cm, 80 mm f2.8 planar, T*lens, two A12 backs, Kiev prism, filters & accessories, exc. cond., in orig. box, \$1,500/firm. 626/285-3810.

CAMERAS: Polaroid land Sun 600; Vivitar Instamatic 845 Telomotr, \$20; FILM SPLICER, 8 mm, \$5. 626/449-3699.

CEMETERY PLOT, Rose Hills Memorial Park & Mortuary, plot (Lot 277, grave 3) located on Alpine Terrace next to the new chapel (gate 1), valued at \$3,200, sell \$1,800. 626/442-9940, Chris.

CHAIRS (4), folding card-table type, by Cosco, vg cond., tan colored, \$32/all. 626/793-1895.

CHAISE, white, exc. cond., was \$600, now \$175. 626/850-4378.

CLOTHING: 2 career woman's suits, finely tailored: 1 red camel hair, sz. 12, \$75; 1 ivory wool, sz. 10, \$90; sueded shirt, indigo/violet color w/ matching multi-design scarf, both from Chico's, \$50; pumps, Bandolino, 2 pairs, sz. 7 1/2, one pair black leather, one pair khaki/gold fabric over leather, \$25/pair; all items exc./new cond., see to appreciate. 626/289-2795.

COFFEE MAKERS, Krups 10-cups, white/ gray, like new, \$40/obo; Braun 10-cups, white/ black, like new, \$30/obo. 626/791-6101.

DIET TAPES, Jenny Craig, set of 14, \$50; COMPUTER POWER CONTR. CENTER, 5 pwr. switches + 1 master switch, 5 surge-protected outlets + 2 modem/fax/phone jacks, new, \$20; ORGAN, Yamaha 415 electronic console, 13 pedals, 3 keyboards, 144 rhythm patterns, pd. \$7,500, sacrfc. for \$2,000. 790-3899.

DODGER TICKETS, selected games from season ticket pkg., Loge level (orange), aisle 140 (nr. 1st base), 2 tickets/game at face value of \$23/ ticket. www.delunac.net/tickets or 626/296-1253.

EXERCISE BIKE, \$25; COMPUTER TABLE, \$5; COMPUTER, P2 Dell, monitor, printer, \$50; SOFA, hide-a-bed, \$15; REFRIGERATOR, \$100; MICROWAVE, \$20; BED, double, \$35; SHELVES, metal, 1 x 8 x 8, \$30; DESK, wood, large, \$80; FILE CABINET, 4 drawer, \$20; offers considered. 626/744-0576, eve.

EXERCISE CYCLE, Ergometer made by Tunturi, adjust. seat height, handlebars and pedal resistance, workout timer, calorie meter, mpg meter, heavy duty unit in exc. cond. manual. \$75. 626/963-5727.

FOOT MASSAGER, multi-speed, works great; orig. \$200+ (purchased at Brookstone) sell for \$50; BACK BELT MASSAGER, Dr. Scholls, new-in-box \$10; CROQUET SET (Brookstone, retails \$100+), still in box, used once, \$40; ROCKING CHAIR, metal "vintage" outdoor, circa 1940s, \$5; exercise equip. for arms and legs isometric exercises, beautiful, \$10. 626/398-4960.

FURNITURE: dining room table, 6 high-back chairs & 2 extra leaves, \$250; couches, two, 6 ft., 200/pair; multimedia / stereo cabinet, \$200; coffee table, rectangular, \$30. 323/257-7668.

FURNITURE: desk & chair, antique mahogany, \$500; glass top tables, indoor/outdoor, 2, rod iron, \$1,500; full sz. bed, child's, new matr., bookshelf, drawers, nightstand, \$500. 248-1102.

FURNITURE: recliner, teal, \$49; peacock chair, wicker, \$29; microwave cart solid oak, \$39; matching oak side table, \$19; bookcase, blue metal, sliding glass doors, 4'w x 3't, \$89; water dispenser for hot & cold water, no bottles needed, \$29; doctor's scale, tall w/ balancing lever, \$49; kneel-on computer chair, \$10; antique full-size bedsprings, \$10; European freezer, needs work, \$19. 626/798-4510.

GOURMET MAGAZINES, back issues, most new, still in plastic covers, \$.50/each; MARBLE

ROLLING PIN with wooden stand, new, never used, \$15; BREAD MAKER, Welbilt, exc. cond., \$15; FRANCISCANWARE, Desert Apple pattern, assorted misc. pieces: \$3-15/ea. 626/398-4960.

JACKET, sportsman's down insulated wilder-ness, with padded collar, men's, size 40 long, good cond., \$25. 626/793-1895.

MINI-DISC PLAYER, Sony, w/record capability, remote, anti-skip, 10 blank discs, great sound, tiny, mint cond., \$99/obo. 687-8627, Alberto.

MISC.: a/c, Kenmore, fits sliding window, only 14" w x 22"t, \$149; quilting frame, \$29; spare tire/wheel, donut, T105 80D-13, used once, \$39; massage machine, fits in chair \$29; extra large mini-blinds 72" w x 50"t, 2 for \$29; golf ball retriever, telescoping alum. 12', \$19; kids rolling duffle bag, multicolor, never used \$19; Pierre Cardin 3-pc. luggage set, \$19; TV, b/w 13" \$19; stroller, pink & gray, \$15. 626/798-4510.

MOVIE ITEMS: camera, Bell & Howell, 8 mm, \$25; movie projector, Bell & Howell, 8 mm, \$35; light bar, Bell & Howell, \$10; light meter, Polaroid pr23, \$10; movie editor, Fairchild, 8 mm, \$20; filters & lens, \$5/ea. 626/449-3699.

MOVING SALE, Sat. March 1, from 9 a.m., 120 S. Mentor Ave. apt. 103, Pasadena, TV/VCR, stereo (multi CD deck), sofa, queen-size bed, Ikea table, kitchen equipment, fridge/freezer, microwave, irons and board, patio furniture, and more. 626/796-3701, Stephen and Susan.

ORGAN, classic Wurlitzer electric (brass reeds), 2 keyboards w/stops, 13 pedals, sideman, black, w/bench, \$625. 626/794-1050.

PATTERN MAKING SYSTEM, Lutterloh, includes tool kit with tailor's curve, instructions, and 280 models and pattern designs manual, used once, \$100/obo. 323/268-6645, Priscilla.

PING PONG TABLE, folding, heavy duty, + paddles, gd. cond., \$25. 626/432-4638.

PORT REPLICATORS (2): 1 advanced, works w/ Dell Inspiron 3700, 3800, 4000, 4100, 8000, 8100 and 8200 Notebook, like new, \$75; other for IBM Thinkpad, works with T20, T21, A20, A21 or X, R series, like new, \$75. 790-3899.

SCANNER/flatbed, Umax Astra 2400s w/Vista Scan software, 8.5 x 14 scannable area/max res 9600x9600 dpi, interface: built in SCSI II; one 25-pin connector and one 50-pin connector, will include: manual, installation software, cables, SCSI card, \$250. 626/791-8161.

STOVE, gas, Magic Chef, slide in, almond, electronic controller, good cond., 10 yrs. old, \$50. 626/794-2431.

SOFTWARE, PrintShop CD Label Creator, brand new in orig. box, Windows XP compat-ible, includes device for applying labels to the CD, \$10; POCKET ELEPHANT, Aurora, w/digital voice alarm and memo recorder, all-in-one calculator, clock/alarm & voice recorder, brand new in sealed pkg., \$10; FAX CARTRIDGE ribbon refill PC-102RF for w/Brother Intellifax models 1150-1950, brand new, \$25. 790-3899.

STROLLER, Emmaljunga, top-of-the-line, side-by-side, twin stroller in hunter green, exc. cond., was \$425, now \$175. 626/850-4378.

SWING, Fisher-Price, Smart-Response, exc. cond., barely used, navy-blue and beige, \$50. 661/298-2647, Dave.

TABLE LAMP, Peacock, copy of a vintage Tiffany, tail has several hundred pieces of stained and leaded glass, \$100/firm. 248-5282.

TREES, red banana plant, 5' tall, \$60/obo; fish tail, 6' tall, \$80/obo; Ficus, braided, in 30" plastic pot >10" tall, \$250/obo; CERAMIC BOWL, gray, 2' diam., w/planted geraniums, \$40/obo. 626/791-6101.

WHEELCHAIR, electric, brand new, extended battery, red w/arm rests, \$2,000; TOOL CHEST, rollaway, w/top box, \$300; BIRD CAGES, 2, wrought iron, 4 ft. high, \$100, 9 ft. high, \$250. 952-7016.

Vehicles / Accessories

'93 BMW 325i, white w/black interior, 100K mi., very clean, exc. cond., \$7,500. 728-1633.

'96 DODGE Grand Caravan, 3.3L V6, gold, dual a/c, dual side doors, well-maintained, good cond., 115,000 miles, \$4,750/obo. 952-2971.

'98 FORD Taurus SE, 24-valve V6, 91K mi., white, tan leather, loaded, \$5,750. 661/424-9441.

'96 FORD Thunderbird LX, V6, 112K mi., 2 dr., exc. cond., new tires and battery, am/fm/stereo/

cass., a/c, cruise control, electric windows, central locking, alloys, very well maintained, \$3,600/obo. 626/796-3701, Stephen.

'93 FORD Explorer XLT, white/tan leather, auto, 4 dr, tinted glass, cassette, 12-disc CD, a/c, power everything, new tires, brakes; 136M, always garaged; all service records; never been in accident; looks and runs great (3E0B478); \$4,600. 626/794-6860, evenings.

'78 GMC Birchaven motorhome, 23 ft., rear bath, classic design with front wheel drive and tandem rear wheels, smooth running 405 V8, rear disc brakes, 79K mi, needs upholstery, \$7,800/obo. 626/447-5433.

'97 HONDA Valkyrie motorcycle, exc. cond., extra chrome, garage kept, purple/white, studded seats (2 seats and backrest), leather bags, many accessories, 23K mi., see to appreciate, \$7,990. 957-2852.

'84 HONDA Sabre VF 700S, 700 cc, 18,500 mi., black, rear rack, windshield, good cond., \$1,400. 626/794-2431.

'95 NISSAN Altima GLX, exc. cond., automatic, a/c, power windows/doors/steering, tilt whl, cruise contr., white exterior, gray int., 93K mi., \$5,000/obo. 626/445-1952 weekdays only, lv. msg., or 760/200-5499 weekends only, lv. msg. '93 NISSAN Pathfinder 4 X 4, exc. cond., 170K mi., new tires, needs transmission, loaded, power everything, CD player, sun roof, and roof rack, \$2,950/obo. 909/981-7492, Darlene.

'98 PORSCHE Boxster, loaded, red/black, hard-top, 37,000 miles, exc. cond., \$29,000. robinson.vj@gte.net or 310/318-6372.

'96 SATURN SW2, manual, exc. cond., anti-lock brakes, cruise control, a/c, power doors, power windows, am/fm/cassette, 100K miles, blue book value \$3,800, sell \$3,000. 323/462-4440.

'02 SUBARU WRX wagon, Sedona Red, 5-sp, air, cruise, allow wheels, CD changer, exc. cond., 12,500 mi., \$19,900. 661/297-3815.

'88 SUZUKI Savage motorcycle, 650 cc, very clean, runs great, maroon, new battery, saddle bags, located (garaged) in Van Nuys, \$1,500. 501-8161.

'95 VOLVO, 850 GLT wagon, 92,000 miles, exc. cond. \$9,500. 248-1102.

Wanted

ENGLISH TUTOR, for writing, middle- and high-school students. 626/796-7238, eves., lv. msg.

SLIDE & JUNGLE GYM, used, to buy in gd. cond. for 2+ year old; MATCHBOX CARS, used, to buy in good cond. 626/296-0611.

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present. 790-8523, Marc Rayman.

TREADMILL, used, in exc. cond. 626/449-0997.

VANPOOL RIDERS, for Lancaster/Palmdale/ Littlerock/Acton area, van leaves Angeles Forest Park & Ride at 5:30 a.m. and returns from JPL at 4 p.m., cost \$140. Frank Shanklin, 3-0505 or Shirlee Kurtz, 4-9737.

Free

CLEAN FILL DIRT, 20 cu. yds. avail., haul as as much as you like, near Los Robles/Jackson, Pas. 791-3103.

For Rent

ALTADENA guesthouse, 1 bd., util. included, non-smoker, street parking, 5 min. to JPL, \$825 + \$500 sec. 626/797-1046.

ALTADENA (NW), 3 bd., 2 ba., new paint & carpet, cent. air/heat, large back yd, quiet st., less than 10 min. to JPL, \$1,950. 626/798-6588.

GLENDALE apt., Occidental alum seeks respon-sible roommate, pref. female, to share a 2 bd., 1 ba., in 8-unit complex, quiet and safe neighb'h'd, covered parking space incl., must be able to live w/2 well-behaved cats, utilities included, \$625 + \$175 security. 323/493-6972.

HACIENDA HEIGHTS, S. of Pasadena, priv. house, avail. June '03, best for academic or professional visitors, 3 bd., 3 ba., library, den, privacy, surrounded by trees, 2,400 sq. ft., high ceiling, attractive furn., all creature comforts, all rooms gd. size, convenient shopping. hacheng@usc.edu or 213/740-2105, Harrison.

LAS VEGAS, 2 houses in The Lakes, 2 bd., 2 ba., 1 has den, 1,250 sq. ft., carpet in bds, tile elsewhere, 2-car garage, gardener pd., incl. appliances, small pets considered, \$1,000 & \$1,050 + \$1,000 sec. 661/254-6134.

PASADENA, spacious and clean 2 bd., 1 ba., den w/fireplace & window seat, lg. formal din. room, office/study, carport & enclosed yard, util. and gardener incl., \$1,795. 952-5568.

PASADENA, lg. immac. condo in cent. located complex, 2 bd., +office, 2 ba., fully furn., ideal for visiting staff, 2 parking spaces, 1 mile/ Caltech, JPL owner, flexible lease, avail. May 1, \$2,500/neg. 202/544-8142, dmt00@earthlink.net.

PASADENA apt. to share, fully furn. 3 bd., 3 ba., townhome-style apt. w/patio, a/c, laundry facil., nr Caltech & JPL, \$625 incl. util. 626/351-9641.

SAN MARINO, share a large 3 bd., 2 ba. house, bright prvt bd., no smoking, no pets, 9 miles to JPL, \$525, util. included. 626/237-0754.

TUJUNGA, Seven Hills, rm in 3 bd., 2 ba., house, in mountains N. of Burbank Studios, quiet neighb'h'd w/great views/hiking trails, mo.-to-mo. lease for respectful non-smoking professional, some kitchen/laundry privileges, utilities shared, \$600. 544-2119, Amy, days.

TUJUNGA/SUNLAND, 2 bd., 1 ba., large living room with fireplace, kitchen with dining area, large fenced yard with separate garage, avail. March 25, \$1,100. 352-1825, evenings, Joe.

VENICE, nr. Rose & Walgrove, charming guest house, high ceiling, newly renovated, quiet neighb'h'd, landscaped yd., parking, refrig., 1-yr lease, \$1,100, incl. util. 310/392-9073.

Real Estate

GLENDALE condo, 2 bd., 2 ba., prime loc., gd. school dist., cent. a/c, hardwood floor, remodeled kitch., exc. vw., pool, \$225,000. 667-5569.

MT. WASHINGTON house, next to Glendale/ Pasadena/Eagle Rock/Occidental College; 2,000 sq ft., lg. custom 3 bd., 2 1/2 ba., 2-car gar., lots of storage; exc. Mt. Washington elem. school, 12 min./JPL, cyn. vw., quiet neighb'h'd, avail. summer '03, \$479,000. 626/403-0446.

Vacation Rentals

BALBOA ISLAND, fully furnished 2 bd., 1 ba., patio, washer/dryer, parking, steps to bay, \$150/night or \$875/week. 626/351-9641.

BIG BEAR LAKEFRONT, luxury town home, 2 decks, tennis, pool/spa, beautiful master bd. suite, sleeps 6. 949/786-6548.

CAMBRIA, ocean front house, sleeps up to 4, excellent view. 248-1102.

CHARENTE, France; pleasant, spacious XVII-lth cent. country house, in Aug. '03, sleeps 7 + sofa bed in l/r; fireplace, washing machine, 2 ba., telephone; in an orchard w/beautiful view, easy driving dist. from markets, 2 1/2 hrs. train from Paris, in a province famous for its many Romanesque churches & castles and by-passed by tourism; \$450/wk. + \$100 returnable cleaning deposit. 310/457-5975, eve.

HAWAII, Kona, ocean front on Keauhou Bay, house / guest house comfortably slp 6, 3 bd., 2 ba., rustic, relaxing, and beautiful, swim-ming, snorkeling, fishing, spectac. vw., nr. restaur., golf, other attractions. 626/584-9632.

HAWAII, Maui condo, NW coast, ocean front vw. 25 ft. fr. surf, 1 bd. w/loft, compl. furn., phone, color TV, VCR, microwave, d/w, pool, priv. lanai, slps 4, laundry fac., 4/15-12/14 \$105/nt./2, 12/15-4/14 \$120/nt./2, \$15/nt./add'l person. 949/348-8047, jackandrandy@cox.net.

OCEANSIDE condo, fully furn., 2 bd., 2 ba., fr-plc., full kitch., quiet, relaxing, beautiful beachside setting, BBQ, pool, spa, game rm., great ocean view; easy walk to pier/restaurants, slps 8, weekly or monthly. 909/981-7492 or dfhauge@yahoo.com, Darlene.

OCEANSIDE, on the sand, charming 1 bd. condo, panoramic view, walk to pier & harbor, pool/spa, game rm., sleeps 4. 949/786-6548.

ROSARITO BEACH condo, 2 bd., 2 ba., ocean view, pool, tennis, short walk to beach on priv. rd., 18-hole golf course 6 mi. away, priv. secure parking. 626/794-3906.